PREVENTION OF OCULAR INJURIES
IN INDUSTRIAL OCCUPATIONS

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Prevention of Ocular Injuries in Industrial Occupations*

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More eyes can be saved by preventing accidents and unfavorable conditions than by treatment and operations after accidents have occurred. A vast majority of eye accidents can be avoided by preventive measures and the exercise of care and judgment. Then why are so many eyes injured or lost in industrial occupations? It is the object of this paper to afford information on this subject, and to warn employers how eye accidents can be avoided, to urge upon them the employment of beneficent measures from a humanitarian standpoint, and to assure them that the adoption of such measures will save them much money, time, effort, and annoyance. It is also necessary to urge employes gladly to accept and utilize all measures for ocular safety placed within their reach, and to exercise diligently common sense and good judgment in the protection of their own eyes and the eyes of others.

The first thing to be considered is the proper examination of men (when I say *men,* I mean both men and women) before they are given employment. When I say "proper," I mean an examination by a well-qualified oculist. It is not sufficient to see if a man's eyes are red, what his vision is when tested by the Snellen's test types, and a few rudimentary observations of this kind. An ophthalmoscopic examination is necessary. Sometimes the field of vision should be taken. The amount of vision in both eyes must, of course, be ascertained, and any refractive error detected and corrected by glasses—if practically necessary. The eye should be carefully examined inside and out, searching for pathologic changes only detectable by an experienced observer. The examiner must bear in mind strabismus, opacities —situated anywhere in the visual area, adhesions,

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fundal changes, refractive errors, abnormal fields of vision, etc., etc. The employer and applicant should both be made aware of the real ocular condition—in justice to them both. The applicant should not be placed at work under conditions unsuitable to his ocular condition, for to do so would be to invite accidents and disaster, as well as to endanger the safety of fellow workmen, as would be the case in trachoma, extremely poor vision, etc., etc. A man who has easily inflammable eyes should not be placed at work in dusty or draughty places. One who is nearsighted should not be expected to see long distance, without glasses; whereas, a man who is presbyopic, astigmatic, or hypermetropic should be expected to wear suitable glasses when engaged on fine work. A man who cannot see clearly at all should only be given rough work—where good eyesight is unnecessary, etc. So that from the side of the workman, ocular deficiencies or disease should be made manifest, while from the side of the employer such information is equally important, as I shall endeavor to explain.

One reason why an employer should know the ocular condition of an applicant before employment is given is the utterly unjust and senseless law that provides that in case a man has already lost the sight of one eye (years ago, perhaps, and while working for some other business organization) and again meets with an accident and loses his remaining eye, his last employer shall be responsible for the loss of both eyes, even though he may have collected damages for the loss of the first eye. The contention is that while he still had one good remaining eye and could see to work, his last accident has deprived him of its use and he is now totally blind, and therefore his last employer must pay him for total blindness. This law clearly works an injustice to both employer and employe. It is irrational to expect the employer to pay for the loss of two eyes when he is only responsible for the loss of one. It is unjust to the employe for it usually debars him from employment, for what employer wishes to employ a one-eyed man when he at the same time assumes a two-eyed responsibility? The one-eyed applicant for work cannot even (under this foolish law) give his desired employer a certificate absolving

him from a two-eyed responsibility, so tightly have the framers of the law constructed this totally irrational and unjust enactment. Many men are thus debarred from work, not only on account of the added responsibility assumed by the employer but also because it is well known that a man with only one eye is a little more liable to accident than one possessed of two good working eyes. Scarcely a day passes that I do not see at least one man claiming injury, where both the employer and I would give a good deal for a report on the man's ocular condition before he secured employment from the employer, who is now in danger of being sued for damages.

Let me present just one illustration; others could be given but time will not permit. A man gets a piece of emery in his cornea, which is easily and harmlessly removed after it has been in the cornea perhaps two days. He claims that before the little accident his vision was perfect, but that now his vision is very much impaired. He is 60 years of age. An examination reveals an old chorio-retinitis with areas of absorbed choroid. This is the cause of his defective vision; the little accident could not possibly have produced such old ravages, and yet I have known men recover damages in just such cases. A preliminary examination before employment would have disclosed poor vision, and the records would show the man's best vision, for an applicant for work always puts his best side out when asking for employment, but his worst side out when trying to establish financial returns in a suit for damages.

Every industrial injury, no matter how slight, contains the possibility of potential damage litigation. Therefore, it behooves the employers of labor to protect themselves as far as possible from dishonest efforts to extort money, and preliminary examinations before employment constitutes one of the chief methods of obtaining such protection. It will cost something to do this, of course, but in the end it is sure to be a great economical success. One unfavorable decision in court would pay for many physical examinations before employment. It should not be forgotten that the best work can only be obtained from men who are in good physical condition, and that when they have bad eyes, and have to strain to see, and are com-

pelled from time to time to care for their eyes, they cannot be superlative working units. Honest employes should welcome such examinations, for they may disclose unsuspected diseases, capable of cure, and it will enable the employers to give men occupations suitable to their infirmities.

Good and proper illumination is essential to good work and is a preventive against accidents. The best illuminant is clear daylight, and the best artificial light is the one that most nearly simulates daylight. This is a subject that greatly interests shop owners, architects, and illuminating engineers. Illumination should be sufficient, but not excessive. It should also be properly placed. It is for these reasons that modern shops and schools have such enormous window spaces, and so much artificial illumination for use on dark days and in dark hours. Illumination should come from above, behind, and from the left, and should illuminate every bench, wheel, vat, machine, etc., so that the worker can see without effort, and without having his vision strained, or embarrassed by excessive or improperly directed light. Shop owners should turn over the question of illumination to architects and illuminating engineers who make a study of such matters, and not make the mistake of endeavoring to handle such matters themselves. By so doing they will save eyes, and increase and improve their output. Improper illumination produces mistakes in work, wasteage of material, and greater liability to accident. Twenty-five per cent of shop accidents are produced by improper illumination, and the least number of accidents occur in July and August, on account of the long, well-lighted summer days. The Tungsten lamp is about the best shop light. They should be surrounded by white enameled globes, that should be kept scrupulously clean. White walls and woodwork and clean windows will add about 30 per cent to the efficiency of either natural or artificial illumination. Shop goggles will avert many accidents. The Pullman Company says that most shop accidents can be prevented by goggles, and preferably the Saniglass goggles, which can be ground to correct any man's refractive error, and are very strong and will resist a very strong blow by a flying missile, etc. Many men disdain the wearing of goggles, and

some feel that they are a hindrance to them in their work, but goggles are growing in favor and will soon be universally adopted, especially as most shop owners are glad to furnish them free, feeling that they are saving eyes and money at the same time.

Improper tools and the absence of suitable protective devices for machines produce many eye accidents. Hammering accidents are usually caused by tools with burred or mushroomed edges. Such tools cause steel particles to fly off and strike the eye, and workers should take great care not to use such tools. They can be easily repaired, or at the worst new tools furnished. Modern shops are being more and more equipped with safety devices. Emery wheels should be protected by guards, and dust sucked away by an exhaust system. Vats containing molten metal produce horrible accidents. They should be surrounded by protectives, and handled carefully. Leather masks, with goggles, should be worn by workers. Electric flashes can be avoided by using enclosed switches and fuse boxes. Riveting and punching machine accidents can be avoided by using goggles. Water and lubricating glass accidents can be much reduced by the use of superior glass and protectives over the glass. Milling machines, shapers, etc., should be protected by glass chip guards. Improperly jointed belting produces eye accidents. Endless or glued-joint belts should be used instead of hooks or lacings to make a joint, and belts should not be moved into place, while in motion, with a stick. Excessive light or heat in shops, especially steel shops where welding is done, may produce retinal and other eye injuries. Screens of blue or red glass should be used, and workers should wear aluminum helmets. Amber goggles should be used in grinding carbon or manganese steel, in blowing glass, or burnishing silver, and when the oxyacetylene torch or electric arc are in use. Shops should be kept cool, clean, light, and as nearly dustless as possible.

What is known as the "Shop Oculist" is gradually losing his popularity. He was and is responsible for many lost and ruined eyes. In most shops could be found a man who was supposed to possess much dexterity in removing foreign bodies from the eyes. He was a worker, and his hands

were large, clumsy, and dirty. They were dirty from honest toil, it is true, but the human eye does not discriminate between honest and dishonest dirt. It can be infected just as quickly from one as from the other. This man would be consulted by his fellow workers when they felt the presence of a foreign body in the eye. He revelled in his reputation and admired his own skill. He would pause from his work when a patient presented himself and, scorning to wash the honest dirt from his hands, launch forth upon his professional duties. His tools were clumsy and dirty. He used no cocain. Sometimes he succeeded in removing the foreign particle without inflicting damage, especially if it was located in the under surface of the upper lid, as so often occurs. But when the particle was imbedded in the cornea, what with no cocain, and consequently excessive eyeball movements, poor illumination, unsuitable lens focusing, dirty and clumsy tools, dirty hands, etc., he usually succeeded in scratching the eyeball considerably and producing more or less infection, without removing the foreign body. These men would then generally be sent where they should have been sent in the first place, to an oculist, who would, of course, find himself immediately handicapped in the management of the case. Every scratch would leave a scar, which would permanently impair vision; or an ulcer might form, leaving a large and probably central scar, exceedingly detrimental to vision; or the infection might spread, panophthalmitis form, and necessitate the removal of the eye. Thus the true function of the "Shop Oculist" has been fulfilled. Doubtless, with the best intentions in the world, he has ventured in a field of work for which he is not fitted, and he has damaged a human eye, and perhaps caused its removal. It seems superfluous to declare that the "Shop Oculist" should be abolished in all shops, and that such work should only be undertaken by a skilled oculist, for operations—while sometimes easy—are frequently extremely difficult and require the skill and patience of an experienced and qualified operator.

Almost all, perhaps all, occupations carry with them certain dangers to the eye, either through trauma or occupation. It is, of course, impossible in a short paper to enumerate all of these misad-

ventures, but I will endeavor to mention some of the more important. In the first place I wish to draw attention to the great army of men, women and children who work in crowded offices with poor illumination and under poor sanitary conditions, doing perhaps very fine work with uncorrected refractive and oculo-muscular conditions. They may have myopia, hypermetropic presbyopia, astigmatism, weak adduction or serious intraocular conditions, etc. Perhaps they do nothing for such conditions but just work on, or maybe they go to an optician, or optometrist, or some free dispensary. Such people should consult a reputable oculist in his office, where they will receive the best attention, and I do not think it is suggesting too much to urge upon employers to exert a supervising influence in such matters. I am sure that almost all oculists would be glad to enter into an arrangement with all large employers of labor to look after their employes at reduced rates, if assured of a good bulk of business.

Attention should be paid to the fact that certain occupations are likely to injure vision and every precaution should be taken to prevent this disaster. For instance, dinitrobenzine, which is used in manufacturing aniline dyes, injures vision by inhalation, which can be prevented by ample ventilation or by using closed mixing vessels. Bisulphide of carbon, used in vulcanizing rubber, produces a vapor which injures vision by producing retinal and optic nerve changes with a very poor prognosis. Nicotine may be absorbed in tobacco factories, with characteristic ocular symptoms. Amblyopia may develop in both tobacco workers and tea tasters.

Paper hangers, painters, workers in arsenical preparations, etc., demonstrate the fact that arsenic is absorbed principally through respiratory tract, producing eye pain and irritability, optic neuritis and atrophy. Eyes are damaged in plumbers and painters where lead is used. Lead enters the body through the fingers and lungs. Headaches, poor vision, scotoma, ptosis, paralysis, etc., are noticed. Carbon monoxid very occasionally produces optic nerve and retinal disturbances and paresis of the ocular muscles.

Most of the ocular disturbances from chemical causes can be avoided by strict cleanliness, espe-

cially of the hands, and by thorough ventilation. Wood alcohol is used in many industries and workmen should always be acquainted with the fact that they are dealing with a deadly poison, capable of producing blindness from optic nerve atrophy, and even death. It is used, for instance, in cleaning off shellac from the interior of beer vats, where the fumes become very strong, especially when the ventilation is poor. This menace can be combated by using as little of it as possible, and by extreme cleanliness and thorough ventilation.

High explosives in mining, railroad construction, etc., produce many serious eye accidents. Bursting bottles in charged water factories and lime burns in masons, bricklayers, plasterers, etc., often produce disastrous ocular damages. Great care under such circumstances, with a full realization of the damages involved, will prevent many sad accidents. The eyes of miners are not only threatened by explosives in dislodging coal, but by nystagmus from working underground with insufficient illumination and from working while lying on the back. Mines should be abundantly lighted, abnormal postures while at work should be avoided, errors of refraction should be corrected, the health should be kept up to the highest standard, and the hours of submerged work should be as short as possible.

Certain occupations, involving exposure of the eye to heat and light, may produce slowly developing cataracts. This is conspicuously the case with glass blowers but may also occur in any industry where the eyes are exposed for long periods of time to intense heat or light. The greatest protection consists in wearing thick, colored glasses that disperse both heat and chemical rays.

I am well aware that this paper has not completely covered the subject. It would have to be much longer to do this, and I did not feel at liberty to occupy too much time. Enough has been said, however, to demonstrate that almost all occupations possess dangers to eyesight that should be thoroughly understood and carefully guarded against. What is needed is; first, an intelligent investigation; and then, action based upon intelligence.

7 West Madison street.

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